GENERAL NOTES

1) Entire dispersal area to be fenced off to any construction. This is prevent the soil being compacted due to: Vehicular traffic and stockpiling of soil from excavation and building material.

2) Absolutely no stripping of soil from onsite dispersal area.

3) Filling of onsite dispersal area is permissable only when required by Health Department.

4) No utilities, T. V. cable or sprinkler system shall be installed in the onsite dispersal area. Sprinkler systems must be installed a minimum of 25 feet from the dispersal area.

5) The following must not be connected to the onsite system and must be diverted from discharging into the onsite system: curtain drain, downspouts, sump pump, water softening backwash, dehumidifier and air conditioning discharge.

6) All trees are to be removed from the septic field area, plus room to work, by cutting and grinding stumps.

7) Septic field must not be installed when ground is wet or frozen.

8) Septic fields are to be landscaped after septic system installation and prior to system being used. Landscaping to be done when ground is dry. Only light weight landscaping tractors allowed on septic field. Landscaping on tank, drop boxes and header line is to be done by hand.

9) Contours provided by Manhard Consulting.

10) The contractor shall provide the appropriate underground concrete storage tank and/or any optional accessories as indicated. The capacity, dimensions and fitting locations and sizes shall be located on the tank manufactures drawings. The tank shall be installed according to manufacturer's current installation instructions. All drawings and instructions shall be reviewed by the Lake County Health Department and the developer prior to manufacture and/or installation of the tank

11) There shall be dual pumps set on an alternating cycle and set such that the off-cycle pump(s) will function as a "lag" with the activation of the high water alarm. The activation of the lag pump(s) function shall not silence the alarm as the water level falls below the high water trigger. The pump(s) and alarm function shall be controlled by sealed mercury float switches or equal, and the dosing cycles shall be mediated by a timer set to activate as described the calculations attached. The control manufactures drawings and specifications shall be reviewed by the Lake County Health Department and the designer prior to installation.

12) The pump manufactures specifications shall be reviewed prior to installation by the Lake County Health Department and the designer.

EARTHWORK

1. EMBANKMENTS FOR PAVEMENT AREAS SHALL BE COMPACTED TO A MINIMUM OF NINETY FIVE PERCENT (95%) BASED ON ASTM D-1557-70 LABORATORY PROCEDURE. EMBANKMENTS IN LAWN AREAS SHALL BE COMPACTED TO A MINIMUM OF NINETY PERcENT (90%) BASED ON ASTM D-1557-70.

2. THE CONTRACTOR SHALL BE RESPONSIBLE FOR MEETING THE REQUIREMENTS OF ALL APPLICABLE SOIL EROSION AND SEDIMENT CONTROL ORDINANCES. THE COST OF ALL WORK NECESSARY TO MEET THESE REQUIREMENTS SHALL BE CONSIDERED AS INCIDENTAL TO THIS CONTRACT, AND NO SEPERATE PAYMENT SHALL BE MADE.

EFFLUENT LINES

HDPE (High Density Polyethylene) Specifications

1) All mainline pipe shall be 2" HDPE
2) All pipe shall be pre-insulated (URECON or equiv.)
3) A tracing wire shall be run with all pipe
4) All pipe shall be burried 42" min.
5) All main line pipe joints shall be butt fusion welded
6) All pipe shall be pressure rated 160 psi - DR 11
7) Service laterals shall be 1 " HDPE
8) All service laterals shall be fusion welded saddle joints to the main line
9) For proper joining techniques refer to PPI Handbook for polyethylene pipe, ASTM D 2657 and pipe manufacture
10) All bedding shall be class I and II ASTM D 2321 with max particle size of 1/2 "

GENERAL SPECIFICATIONS

GENERAL

1. EARTHWORK AND PAVING SPECIFICATIONS
THE ILLINOIS DEPARTMENT OF TRANSPORTATION "STANDARD SPECIFICATIONS FOR ROAD AND BRIDGE CONSTRUCTION", LATEST EDITION, AND ALL ADENDA THEREOF, SHALL GOVERN THE EARTHWORK AND PAVING WORK UNDER THIS CONTRACT, EXCEPT AS NOTED BY THESE SPECIFICATIONS

2. COMPLIANCE WITH LOCAL ORDINANCES
ALL WORK PERFORMED UNDER THIS CONTRACT SHALL BE IN ACCORDANCE WITH LAKE COUNTY ORDINANCES AND STANDARDS

3. GUARANTEE
ALL WORK DESCRIBED UNDER THIS CONTRACT SHALL BE GUARANTEED TO THE COUNTY OF LAKE AND THE OWNER BY THE CONTRACTOR AND HIS SURETY FOR A PERIOD OF 12 MONTHS AFTER FINAL ACCEPTANCE OF THE WORK AGAINST ALL DEFECTS IN MATERIALS AND WORKMANSHIP OF WHATEVER NATURE.

4. EXISTING UTILITIES
WHEN THE PLANS OR SPECIAL PROVISIONS INCLUDE INFORMATION PERTAINING TO THE LOCATION OF UTILITY FACILITIES SUCH INFORMATION REPRESENTS ONLY THE OPINION OF THE ENGINEER AS TO THE LOCATION OF SUCH UTILITIES AND IS ONLY INCLUDED FOR THE CONVENIENCE OF THE BIDDERS. THE ENGINEER AMD THE OWNER ASSUME NO RESPONSIBILITY WHEREVER IN RESPECT TO THE SUFFICIENCY OR ACCURACY OF THE INFORMATION SHOWN ON THE PLANS RELATIVE TO THE LOCATION OF UTILITY FACILITIES, NOR THE MANNER IN WHICH THEY ARE TO BE REMOVED OR ADJUSTED. IT IS THE CONTRACTORS RESPONSIBILITY TO DETERMINE THE ACTUAL LOCATION OF ALL UTILITIES. THE CONTRACTOR SHALL OBTAIN FROM THE RESPECTIVE UTILITY COMPANIES DETAILED INFORMATION RELATIVE TO THE LOCATION OF THEIR FACILITIES AND THE WORKING SCHEDULES OF THE UTILITY COMPANIES FOR REMOVING OR ADJUSTING THEM

5. SCOPE OF WORK
CONTRACTOR SHALL BE RESPONSIBLE FOR INITIATING, MAINTING AND SUPERVISING ALL SAFETY PRECAUTIONS AND PROGRAMS IN CONJUNCTION WITH THE WORK. CONTRACTOR SHALL TAKE ALL NECESSARY PRECAUTIONS FOR THE SAFETY OF, AND SHALL PROVIDE THE NECESSARY PROTECTION TO PREVENT DAMAGE, INJURY OR LOSS TO:
1) ALL EMPLOYEES AND OTHER PERSONS AND ORGINIZATIONS WHO MAY BE AFFECTED THEREBY
2) ALL THE WORK AND MATERIALS AND EQUIPTMENT TO BE INCORPORATED THEREIN, WHEATHER IN STORAGE ON OR OFF SITE; AND
3. OTHER PROPERTY AT THE SITE OR ADJACENT THERETO, INCLUDING TREES, SHRUBS, LAWNS, WALKS, PAVEMENTS, ROADWAYS, STRUCTURES UTILITIES AND UNDERGROUND FACILITIES NOT DESIGNATED FOR REMOVAL, RELOCATIONS OR REPLLACEMENT IN THE COURSE OF CONSTRUCTION. CONTRACTOR SHALL DESIGNATE A RESPONSIBLE REPRESENTATIVE AT THE SITE WHOSE DUTY SHALL BE THE PREVENTION OF ACCIDENTS. THE PERSON SHALL BE THE CONTRACTORS SUPERINTENDENT UNLESS OTHERWISE DESIGNATED IN WRITING BY CONTRACTOR TO OWNER.

6. EXISITNG ELEVATIONS AND LOCATIONS
THE CONTRACTOR(S) SHALL VERIFY THE ELEVATIONS AND LOCATIONS OF ALL EXISTING INFORMATION AS SHOWN ON THE PLANS AND SHALL NOTIFY THE ENGINEER OF ALL DISCREPANCIES PRIOR TO THE COMMENCEMENT OF WORK.

7) NOTIFICATION
THE LAKE COUNTY HEALTH DEPARTMENT DEPARTMENT SHALL BE NOTIFIED AT LEAST TWO WORKING DAYS PRIOR TO COMMENCEMENT OF CONSTRUCTION.

8) COMPLIANCE WITH LAWS AND REGULATIONS
THE CONTRACTOR(S) SHALL COMPLY WITH ALL LOCAL AND STATE SAFETY LAWS, REGULATIONS AND ORDINANCES AND FEDERAL SAFETY REGULATIONS AS OUTLINED IN THE LATEST REVISIONS OF THE FEDERAL CONSTRUCTION SAFETY STANDARDS AND WITH ALL REVISIONS AND REGULATIONS OF THE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) STANDARDS.
EACH CONTRACTOR IS RESPONSIBLE FOR PROVIDING A SAFE WORKING PLACE FOR HIS EMPLOYEES. THE CONTRACTOR(S) ARE RESPONSIBLE FOR THE SUPERVISION, DIRECTION AND CONDUCT OF THEIR EMPLOYEES, AGENTS, MATERIAL SUPPLIERS AND VENDORS.

9. INDEMINITY AND HOLD HARMLESS
THE CONTRACTOR(S), BY USING THESE PLANS FOR THEIR WORK, AGREE TO HOLD HARMLESS OLSON, CIORBA, SHANE & CO. THEIR EMPLOYEES AND AGENTS WHILE ACTING WITHIN THE SCOPE OF THEIR DUTIES FROM AND AGAINST ANY AND ALL LIABILITY, CLAIMS, DAMAGES, AND THE COST OF DEFENSE ARISING OUT OF CONTRACTOR(S) PERFORMANCE OF WORK DESCRIBED HEREIN.

10. UTILITY TRENCHES
ALL UTILITY TRENCHES UNDER AND WITHIN TWO FEET OF PAVEMENT, CURB AND GUTTER, ETC. SHALL BE BACKFILLED WITH CA-6 CRUSHED STONE (GRADE 8 OR 9), COMPACTED IN 9 INCH LIFTS TO 95% OF MODIFIED PROCTOR.

11. GRASS AREA WITHIN RIGHT-OF-WAY
ALL GRASS AREA WITHIN THE RIGHT-OF-WAY DISTURBED DURING CONSTRUCTION SHALL BE RESTORED BY SEEDING.

12. EXISTING DRAIN TILE
ALL EXISTING FIELD DRAINAGE TILE ENCOUNTERED OR DAMAGED DURING CONSTRUCTION SHALL BE RESTORED TO THEIR ORIGINAL CONDITION, PROPERLY REROUTED, AND CONNECTED TO THE NEAREST STORM SEWER, DETENTION BASIN OR OUTLET PIPE

13. ITEMS NOT SPECILICALLY SHOWN
ALL ITEMS THAT ARE NOT SPECIFICALLY SHOWN ON THE PLANS OR IN THE SUMMARY OF QUANTITIES BUT CAN REASONABLE BE INTERPRETED TO BE INCLUDED IN THE WORK DISCRIBED SHALL BE INCIDENTAL TO THE COST OF THIS CONTRACT.

14. EXCESS TRENCH MATERIAL
THE CONTRACTOR SHALL DISPOSE OF EXCESS TRENCH MATERIAL AS DIRECTED BY THE OWNER AND THIS WORK SHALL BE INCIDENTAL TO THE COST OF THIS CONTRACT

15. FINAL FRAME ADJUSTMENTS
THE CONTRACTOR SHALL MAINTAIN AND KEEP UP TO DATE A SET OF "RECORD DRAWINGS" SHOWING ALL CHANGES FROM THE ORIGINAL PLANS. THE CONTRACTOR SHALL DELIVER THE "RECORD DRAWINGS" TO THE ENGINEER AT THE CONCLUSION OF THE PROJECT. THE ENGINEER WILL TRANSFER THE INFORMATION TO THE ORIGINAL PLANS

16.. AS-BUILD DRAWINGS WILL BE PROVIDED TO THE LAKE COUNTY HEALTH DEPARTMENT UPON COMPLETION OF THE IMPROVEMENTS.

SHEETING AND BRACING

SHEETING AND BRACING SHALL BE PLACED IN THE TRENCH AS MAY BE NECESSARY FOR THE SAFETY OF THE WORK AND PUBLIC, FOR THE PROTECTION OF THE WORKMEN, ADJACENT PROPERTIES, PAVEMENT OF STRUCTURES, AND FOR THE PROPER INSTALLATION OF WORK. IN ANY EVENT, THE MINIMUM PROTECTION SHALL CONFORM TO THE RECOMMENDATIONS IN O.S.H.A. SAFETY AND HEALTH STANDARDS FOR CONSTRUCTION. A SAND BOX OR TRENCH SHIELD MAY BE USED IN PLACE OR SHEETING AS PERMITTED BY O.S.H.A. WHEN CLOSE SHEETING IS USED, IT SHALL BE DRIVEN SO AS TO PREVENT ADJACENT SOIL FROM ENTERING THE TRENCH EITHER BELOW OR THROUGH SUCH SHEETING.

NOTICE TO CONTRACTOR

BEFORE BEGINNING CONSTRUCTION, THE CONTRACTOR MUST VERIFY THE ENGINEER'S LINE AND GRADE STAKES. IF THERE ARE ANY DISCREPANCIES FROM WHAT IS SHOWN ON THESE PLANS, HE MUST IMMEDIATELY REPORT SAME TO ENGINEER BEFORE DOING ANY WORK, OTHERWISE CONTRACTOR ASSUMES FULL RESPONSIBILITY

ORENCO GENERAL SPECIFICATIONS

General Specifications

Throughout this document, the terms "or engineer-approved equal" and "or approved equal" are used. For this project the terms "engineer-approved equal" or "approved equal" shall mean equal in the judgement of the engineer. Bidders seeking approval of products as an "approved equal" shall furnish written evidence that such product conforms in all respects to the specified requirements, and that it has been used successfully elsewhere under similar conditions. Where the specified requirements involve conformance to recognized codes or standards, the bidder shall furnish evidence of such conformance in the form of test or inspection reports. Bidders seeking approval of products as an "approved equal" shall provide submissions, meeting the above requirements, no fewer than 10 days prior to bid opening for review by the engineer. Failure to provide complete data will be cause for rejection of the product.

A. ONSITE INTERCEPTOR TANKS

1. General:
a. The manufacturer shall provide the structural design and certification to the engineer for review. The design shall be in accordance with accepted engineering practice. Precast concrete or fiberglass tanks shall have been designed by a registered engineer and approved by state or local regulatory agencies or authorities

b. Loading Criteria:
o There shall be 140 lbs./cu.ft. for minimum weight of saturated backfill, or 127 lbs./cu.ft. for unsaturated backfill (500 lbs./sq.ft.minimum).
o Minimum lateral loading shall be 62.4 lbs./cu.ft. Lateral loading shall be determined from ground surface.
o The tank shall also support a concentrated wheel load of 2500 lbs.

There are four (4) typical loading conditions that should be analyzed:
1) 4 ft. Bury + Full Exterior Hydrostatic Load
2) 4 ft. Bury + Full Exterior Hydrostatic Load + 2500 lb. Wheel Load.
3) 1 ft. Bury + 2500 lb. Wheel Load.
4) Tank Full, Interior Hydrostatic Load and Unsupported by Soil.
Load Case 4 represents the tank full of liquid at 62.4 lbs/cu.ft. This condition addresses seam and haunch stress-strain relationships that occur during watertightness testing, as well as poor soil bedding conditions that provide inadequate support.

c. Tanks requiring deep burial (>48") or subject to truck or heavy traffic loading require special consideration. (A minimum soil cover of 12" shall be used, unless specified otherwise by manufacturer.)
d. All tanks shall be structurally sound and watertight and shall be guaranteed in writing by the tank manufacturer for a period of two years from the date of final acceptance. Manufacturer's signed guarantee shall accompany bids. The tank guarantee/warranty shall be furnished at the time of submittal. Tank warranty shall not be limited liability to replacement cost of the tanks. The septic tank shall be capable of withstanding long-term hydrostatic loading, in addition to the soil loading, due to a water table maintained at ground surface.
e. Tanks shall be manufactured and furnished with access openings 20" in diameter and of the configuration shown on the manufacturer's drawings. Modification of completed tanks will not be permitted.
f. Inlet plumbing shall include an inlet tee that penetrates 18" into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth.) The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stack.
g. Tanks shall be capable of successfully withstanding an aboveground static hydraulic test and shall be individually tested.
h. All tanks shall be installed in strict accordance with the manufacturer's recommended installation instructions.

2. Concrete Tanks:
a. Walls, bottom and top of reinforced concrete tanks shall be designed across the shortest dimension using one-way slab analysis. Stresses in each face of monolithically constructed tanks may be determined by analyzing the tank cross-section as a continuous fixed frame.
b. The walls and bottom slab shall be poured monolithically; alternatively, water stops may be provided.
c. Reinforcing steel shall be ASTM A-615 Grade 60, fy = 60,000 psi. Details and placement shall be in accordance with ACI 315 and ACI 318.
d. Concrete shall be ready-mix with cement conforming to ASTM CI50, Type II. It shall have a cement content of not less than six (6) sacks per cubic yard and maximum aggregate size of 3/4". Water/cement ratio shall be kept low (0.35±), and concrete shall achieve a minimum compressive strength of 4000 psi in 28 days. The Contractor shall submit a concrete mix design to the Engineer for review and approval. Three (3) concrete sample cylinders shall be taken and tested for each tank manufactured until the manufacturer and Engineer are satisfied that the minimum compression strength is being obtained. To ensure compliance, the manufacturer shall then make and set three (3) sample cylinders for a minimum of 20% of the remaining tanks at the discretion of the Engineer. If the minimum compressive strength being obtained, the manufacturer shall be required to make and test sample cylinders for each tank manufactured. Calcium chloride will not be allowed in the mix design. The cost of testing cylinders shall be the tank manufacturer's responsibility. The tank manufacturer may supply a Swiss hammer for compressive testing in the field in lieu of sample cylinders.
e. Tanks may be protected by applying a heavy cement-base waterproof coating (Thoroseal® or approved equal), on both inside and outside surfaces, in compliance with Council of American Building Officials (CABO) report #NRB-168; 6181; however, the tank should be watertight without the addition of seal coatings.
f. Form release used on tank molds shall be Nox Crete™ or approved equal. Diesel or other petroleum products are not acceptable.
g. Tanks shall not be moved from the manufacturing site to the job site until the tank has cured for seven (7) days or has reached two-thirds of the design strength.
h. Tanks shall be manufactured and furnished with access openings of the size and configuration to accommodate individual packaged pump systems. For 24" diameter access risers, the tank manufacturer shall cast in place a flanged tank adapter to facilitate the bonding of a 24" diameter access riser. The flanged tank adapter shall be made of 1/4" thick ABS and shall have an outside diameter of 27" and an inside diameter of 22-3/4". The flanged adapter shall be Orenco Systems®, Inc. Model PRTA24 or engineer-approved equal. The adapter must have an overall height of no less than 3" to allow 1-1/2" exposed for sufficient bonding area once the adapter is installed in the tank. For 21" and 30" diameter access risers, either a grooved tank adapter plate (Model RRFTA or RRFTA30) or a flanged tank adapter (Model FRTA30) may be installed in the tank. The adapter shall be manufactured of fiberglass or ABS and shall accommodate either a 21" or 30" diameter access riser.
i. The septic tank and the top slab shall be sealed with a preformed flexible plastic gasket. The flexible plastic gasket shall be equal to the flexible butyl resin sealant congeal CS-102 or CS-202 as manufactured by Concrete Sealants, Inc. of New Carlisle, Ohio, and shall conform to federal specification SS-S-00210(2iOA) and AASHTO M-198. A mechanical fastening method shall be used if the seasonal groundwater level may reach the top slab seam of the tank.
j. In order to demonstrate watertightness, tanks shall be tested twice prior to acceptance. Inlets to the septic tank will be watertight pipe seal Cast-A-Seal™ (Manufactured by Press-Seal Gasket Corporation) or approved equal. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand. After 24 hours, the tank shall be refilled to the soffit and the exfiltration rate shall be determined by measuring the water loss during the next two (2) hours. Any leakage shall be cause for rejection. After installation is completed, each tank shall be filled with water to a point 2" into the access riser and retested as previously described (the field test period may be reduced to not less than two (2) hours). Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift. No tank will be accepted if there is any leakage over the two (2) hour period.

3. Fiberglass Tanks:
a. Method of Calculations:
1) Fiberglass tanks shall be analyzed using finite element analysis for buried structures.
2) Calculations shall address the following:
o strength
o buckling
o deflection of 5% of the tank diameter, based on service load (including long-term deflection lag)
o buoyancy
3) Performance testing

Material Properties and Laminates

The laminates considered in this analysis shall be of general-purpose ortho-polyester resin with E-type fiberglass reinforcement or higher grade. The thicknesses for different regions of the tanks shall be described and shown in shop drawings for each individual tank.

The laminate properties listed here, along with the minimum thicknesses as described herein, are considered typical design values that must be maintained during the manufacturing of the tanks.

Typical primary strength properties are listed below:

Tensile Modulus (psi)	1,000,000
Ultimate Tensile strength (psi)	10,000
Ultimate Compressive strength (psi)	21,000
Ultimate Flexural strength (psi)	18,000
Ultimate Shear In-Plane (psi)	7,800

b. In lieu of calculations for fiberglass tanks, the supplier may elect in-situ performance testing.
c. In-situ testing of each tank model shall include use of strain gauge and deflection gauge. The tank will be subjected to external forces equal to twice the actual load.
d. Maximum initial deflection based on test loading shall not exceed 3% of the tank diameter.
e. Performance testing will be evaluated by a Registered Professional Engineer (P.E.). The Engineer will have the sole responsibility to determine the maximum external loading on any of the tank models.
f. The tank shall be constructed with a glass fiber and resin content specified by the manufacturer and with no exposed glass fibers. Any permanent metal part shall be 300 series stainless steel.
g. Inspections may be made by the engineer in the supplier's yard, within the plant, upon delivery and again after installation. The minimum wall thickness shall be 3/16". If the wall thickness is suspected to be less than 3/16" or if delamination is suspected within any portion of the tank, the engineer may drill a 1/4" diameter hole through the tank wall for inspection purposes. If the required minimum 3/16" thickness is not found, repair if feasible shall be the responsibility of the contractor. If repair is judged not feasible, the tank shall be rejected. If twenty percent (20%) or more of the tanks are rejected for any of the aforementioned reasons, each tank under this bid will become suspect of substandard quality and subject to rejection by the engineer. If the required minimum 3/16" thickness is found and no delamination is present, the repair of the inspection holes shall be the responsibility of the engineer.
h. The engineer shall specify the minimum weight of each tank model that will be allowed. The manufacturer will permanently mark the weight of each tank on the top near the access hole.
i. The minimum tank weight shall be specified by the manufacturer's engineer (e.g., 350 lbs for 1000-gallon tanks, 400 lbs for 1500-gallon tanks ±).
j. Holes specified for the tank shall be provided by the manufacturer. Resin or other appropriate sealant shall be properly applied to all cut or ground edges so that no glass fibers are exposed and all voids are filled.
k. Orenco Systems' EPDM gaskets, or approved equal, shall be used at the inlet to join the tank wall and the inlet piping. ABS or Schedule 40 PVC pipe and fittings shall be used at the inlets.
l. Inlet plumbing shall include an inlet tee that penetrates 18" into the liquid from the inlet flow line. (The depth may vary depending on the tank's height; in all cases, though, the inlet should extend to a level below the bottom of the maximum scum depth). The inlet plumbing shall allow for natural ventilation back through the building sewer and vent stac
m. Water testing shall be performed on each tank and shall be witnessed by the engineer. Every tank shall be assembled by the manufacturer and filled with water to the brim of the access opening for a minimum of two (2) hours. The tank shall show no leakage from section seams, pinholes or other imperfections. Any leakage is cause for rejection.
n. When leakage occurs, if the tank is not rejected by the engineer, an additional water test shall be made on the tank after repairs have been completed, upon request by the engineer. The manufacturer shall be responsible for making all corrective measures in production or assembly necessary to ensure a completely watertight tank.
o. After installation of tank with riser is completed, each tank shall be filled with water to a point 2" into the access riser and the water loss measured after a two-hour period. Every tank test shall be witnessed by the engineer. Any leakage shall be cause for rejection. Backfill of a depth equal to the water height in the riser must be in place over the tank to prevent damage due to hydrostatic uplift.
p. Each tank shall be marked in the uppermost surface above or near the outlet and include a permit or identification number, weight of tank, type of tank, and date of manufacture.
q. Installation shall be in accordance with the manufacturer's recommendations, or as shown on the Contract Plans, whichever is more stringent-no variations.

B. RISERS & LIDS:

1. Risers:
Risers shall be required for access to internal vaults and access into the septic tanks for septage pumping. All risers shall be constructed watertight. The risers shall be attached to the tanks such that a watertight seal is provided. Risers shall extend 3" above original grade to allow for settlement and to ensure positive drainage away from the access. Risers for inspection ports shall be a minimum of 18" in nominal diameter. Risers containing pumping assemblies or electrical splice boxes shall be a minimum of 24" in diameter and shall be of sufficient diameter to allow removal of internal vaults without removing splice boxes, etc. Risers shall be a minimum of 30" in nominal diameter when the depth of bury is 36" or greater. All other risers shall be a minimum of 24" in nominal diameter and shall vary in height depending on the depth of bury on the various tanks. Adhesive required to adhere the PVC or fiberglass risers to either fiberglass or ABS tank adapter shall be either a two-part epoxy, Model MA320 or approved equal, or a single component adhesive Model ADH100 or approved equal. To ensure product compatibility, risers, lids, and attachment components shall be s upplied by a single manufacturer.

2. Inlet Risers:
Inlet risers (required only on two-compartment tanks and tanks with greater than 1500-gallon capacity) shall be ribbed PVC as manufactured by Orenco Systems®, Inc. or engineer-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1/2". Risers shall extend to 2" above the ground surface to allow for settlement and shall have a minimum nominal diameter of 18".

3. Outlet Risers:
Outlet risers shall be ribbed PVC as manufactured by Orenco Systems®, Inc. or engineer-approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. The risers shall be constructed of non-corrosive material and designed to be buried in soil. Risers shall have a minimum stiffness of 10 psi, when tested according to ASTM D2412. Risers shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minute with a maximum vertical deflection of 1/2". Risers shall be at least 12" high, shall have a minimum nominal diameter of 24" for simplex pumping applications or 30" when used in a duplex pumping application and shall be factory-equipped with the following:
a. Electrical and Discharge Grommets: when applicable, Orenco Systems' EPDM grommets shall be installed by the manufacturer for discharge piping, vent piping, and/or the electrical conduit to assure a watertight seal. The grommets shall be installed at the factory by the manufacturer of the access risers.
b. Adhesive: When bonding to concrete or fiberglass grooves, a two-part epoxy, one pint required per 18" or 24" diameter riser and one quart required per 30" diameter riser, Model ADHP10 or ADHQ10, or approved equal shall be used. When bonding to a flanged riser tank adapter, either a two-part epoxy, Model MA320 or approved equal, or a single component adhesive Model ADH100 or approved equal shall be used.

4. Riser-To-Tank Attachment:
Risers shall be attached to tanks with one of the following attachment systems, or approved equal: (1) Orenco Systems®, Inc. Model RUBDKIT attachment kit; (2) Orenco Systems®, Inc. Model PRTA24 tank adapter used with Model PRTA24BDKIT bolt down kit, and Model MA320 or ADH100 adhesives; (3) Orenco Systems®, Inc. Model RRFTA tank adapter used with Model RRFTABDKIT bolt down kit and Model ADHP10 adhesive; (4) Orenco Systems®, Inc. Model FRTA30 tank adapter used with Model FRTA30BDKIT bolt down kit and Model ADH100 adhesive. All attachment components shall be constructed of waterproof, non-corrosive materials, such as PVC, ABS, fiberglass, or stainless steel. Adhesives and sealants shall be waterproof, corrosion resistant and approved for the intended application. The riser-to-tank connection shall be watertight and structurally sound. The riser-to-tank connection shall be capable of withstanding a vertical uplift of 5000 pounds to prevent riser separation due to tank settlement, frost heave, or accidental vehicle traffic over the tank.

5. Lids:
One lid shall be furnished with each access riser. Lids shall be Orenco Systems®, Inc. Model FL18G-4BU, FL21G, FL24-4B, FL24G-4BU, or FL30G or engineer-approved equal, as appropriate, fiberglass with green non-skid finish, and provided with stainless steel bolts, and wrench. Manufacturer shall provide evidence that lids have been used successfully in continuous field service for a minimum of five years to demonstrate long-term integrity and suitability for the application. Lids shall be waterproof, corrosion resistant and UV resistant. Lids shall be flat, with no noticeable upward dome. A crown or dome of no more than 1/8" is allowable. Lids shall not allow water to pond on them. Lids shall have a green non-skid finish. Self-lubricating plastics, such as polyethylene, shall not be considered non-skid without addition of a non-skid coating. Lids shall form a watertight seal with the top of riser. Lids shall be capable of withstanding a truck wheel load (36 square inches) of 2500 pounds for 60 minutes with a maximum vertical deflection of 1-1/2". Lids shall be provided with tamper-resistant stainless steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square. Fasteners that can be removed with common screwdrivers, such as slotted and Phillips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant. To prevent a tripping hazard, fasteners shall not extend above the surface of the lid.
Traffic bearing lid: The traffic bearing lid shall be a cast iron frame and cover, part number 6024, 3060, 4036, as manufactured by Sather Manufacturing Co., Inc., or approved equal, which will fit over a standard lid. The cover shall have the word SEWER cast into it.

6. Insulation (if required):
Rigid closed-cell foam insulation of 2" or 4" thickness shall be mechanically attached to the underside of the lid. AQll fastners shall be made of corrosion resistent stainless steel. The insulation shall have an R-value of no less than 10 per 2" increment.

7. Riser Installation:
Riser installation shall be accomplished according to the manufacturer's instructions.

Lids shall be provided with tamper-resistant stainless steel fasteners and a tool for fastener removal. Tamper-resistant fasteners include recessed drives, such as hex, Torx, and square. Fasteners that can be removed with common screwdrivers, such as slotted and Philips, or fasteners that can be removed with standard tools, such as pliers or crescent wrenches, are not considered tamper-resistant. To prevent a tripping hazard, fasteners shall not extend above the surface of the lid.

4. Riser Installation:
Riser installation shall be accomplished according to the manufacturer's instructions.

5. Effluent Filter:
All filter systems shall be supplied by a reputable manufacturer with at least five years of experience in supplying equipment for effluent sewers. Effluent filters shall prevent particles larger than 1/8" in diameter from leaving the tank. Effluent filters shall have a solid bottom or deflecting device that prevents vertically rising solids from reaching the filtering surface area during ebullition (sludge bulking).

Gravity system tanks for single-family dwellings of less than four bedrooms shall be equipped with an Orenco Systems®, Inc. Biotube® Effluent Filter (FT04 Model Series) or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have an effective flow area of no less than 172 square inches.

For single-family dwellings of four bedrooms or larger, the tanks shall be a minimum of 1,500 gallons and equipped with an Orenco Systems®, Inc. Biotube® Effluent Filter (FT08 Model Series) or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have an effective flow area of no less than 722 square inches.

The Effluent Filter shall consist of either a 4" or 8" diameter PVC vault with eight holes (1-1/8" in diameter for the 4" filter, 1-3/8" diameter for the 8" filter) evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). The Biotube® cartridge shall be made with 1/8" mesh polypropylene and with a solid base (to prevent solids from entering through the bottom during ebullition). The Biotube® cartridge shall be housed inside the PVC vault.

The direct-coupled outlet for the 4" filter shall contain two (2) 1/2" diameter flow modulating orifices and one (1) 1/2" diameter vent hole. The direct-coupled outlet for the 8" filter shall contain two (2) 1-1/8" diameter flow modulating orifices and one (1) 3/4" diameter vent hole. The lateral from the tank to the collection line shall be laid to a uniform grade with no high points.

Note: Commercial and multiple-user tanks require larger Effluent Filters, the sizes of which must be individually determined and spelled out in the specifications. Commercial applications should be sized according to the Orenco Systems®, Inc. document titled "Biotube® Effluent Filter Sizing."

D. SEPTIC TANK EFFLUENT PUMPING ASSEMBLIES:

For Single-Family Dwellings
All pumping systems shall be supplied by a reputable manufacturer with at least five years of experience in supplying equipment for effluent sewers. References must be available on request from the engineer. Systems shall be Orenco Systems®, Inc. High-Head Pumping Assemblies or engineer-approved equal, c omposed of:

1. Risers & Lids:
Same as B, 1 through 7, above.

2. Pump Vault:
Orenco Systems®, Inc. Model PVU57-1819, Universal Biotube® Pump Vault or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have a minimum effective screen area of no less than 15.5 square feet. (Note: Commercial and multiple-user tanks may require a larger or duplex Biotube® Pump Vault, the sizes of which must be individually determined and spelled out in the specifications.) The Biotube® Pump Vault shall consist of a 12" diameter, 57" deep HDPE vault with eight (8) 2" diameter holes evenly spaced around the perimeter, located appropriately to allow for maximum sludge and scum accumulation before requiring pumping (approximately 70% of minimum liquid level). Housed inside the polyethylene vault shall be the Biotube® assembly consisting of 1/8" mesh polypropylene tubes. Attached to the vault is a flow inducer to accept one or two high-head effluent pumps.

3. Discharge Hose and Valve Assembly:
Orenco Systems®, Inc. Model HV100BC, 1" diameter, 150 psi PVC ball valve, 150 psi PVC check valve, PVC flex hose with working pressure rating of 100 psi, and Schedule 40 PVC pipe. When pumping downhill, include anti-siphon assembly (Model HVAS100). Six-gpm flow controllers (Model FC) are available, if necessary.

4. Float Switch Assembly (also see Alternate):
Orenco Systems®, Inc. Model MFABT with three switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high- and low-level alarms and on/off function shall be preset as shown in the engineer's plans. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC.

Alternate: VeriComm® Remote Telemetry Float Control System
Orenco Systems®, Inc. Model MF3A with three switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high- and low-level alarms and on/off function shall be preset as shown in the engineer's plans. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC.

5. High-Head Effluent Pump:
Must be approved for use in pump vault as described in D2. For most applications, an Orenco Systems®, Inc. Model P100511, 1/2 hp, 115 VAC, single phase, 60 Hz, two-wire motor, with 10 foot long extra heavy duty (SO) electrical cord with ground. Pump shall be capable of providing a flow rate of 5 gpm against a head of 200 feet, or 10 gpm against a head of 135 feet. When used in conjunction with a flow controller, the pump shall be capable of providing 5 gpm against a head of 160 feet. Pump shall be UL and CSA listed as an effluent pump. Pump shall be provided with a non-prorated five-year warranty. Larger horsepower units are available (3/4 to 1-1/2 hp, 230 VAC).

6. Electrical Splice Box:
Orenco Systems®, Inc. Model SB4, UL approved for wet locations, equipped with four electrical cord grips and a 3/4" outlet fitting. Also included shall be UL listed waterproof butt splice connectors. The use of a UL-approved conduit seal kit shall be required to prevent the passage of gases, vapors, or flames through the conduit.

7. Controls and Alarms (also see Alternate):
Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly. Panel shall be Orenco Systems®, Inc. Model S1ROETMCT control panel meeting the following:
Standard Components:
a. Motor-Start Contactor: 115 VAC: 14 FLA, 3/4 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA). 230 VAC: 14 FLA, 2 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% FLA).
b. Toggle Switch: Single-pole, double-throw MOA switch. 20 amps, 1 hp.
c. Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 115 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
d. Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole 115 VAC, double-pole 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
e. Audio Alarm: 80 dB at 24", warble-tone sound.
f. Visual Alarm: 7/8" diameter red lens, "Push-to-silence." NEMA 4, 1-watt bulb, 115 VAC
g. Panel Enclosure: Measures 11" high x 9.3" wide x 5.4" deep. NEMA 4X rated. Constructed of UV-resistant fiberglass; hinges and latch are stainless steel. Conduit couplings provided.
h. S1RO Panel Ratings: 115 VAC, 3/4 hp, 14 amps, single phase, 60 Hz.
i. S2RO Panel Ratings: 230 VAC, 2 hp, 14 amps, single phase, 60 Hz.
j. Event Counter: 115 VAC, 6-digit, non-resettable.
k. Elapsed Time Meter: 115 VAC, 7-digit, non-resettable. Limit of 99,999 hours; accurate to 0.01 hours.

Optional Components:
l. Pump Run Light: 7/8" green lens. NEMA 4, 1-watt bulb, 115 VAC.
m. Heater: Anti-condensation heater. Self-adjusting: radiates additional wattage as temperature drops.
n. Intrinsically Safe Control Relays: 115 VAC. Listed per UL 913, for Class 1 Div. 1, Groups A, B, C, D hazardous locations. Larger enclosure required.
o.Current Sensor: 115 VAC. Go/no-go operation. Pump fail indicator light on panel. Manual reset switch.

Alternate: VeriComm® Remote Telemetry Control System
The system will be monitored via remote telemetry, UL-recognized and FCC-approved for the application, and shall contain the following operating modes:
o A "Start-up Mode" during which the system will collect trend data for establishing future operating standards,
o A "Normal Mode" that manages day-to-day functions of the system,
o A "Test Mode" that suspends data collection and communications with the central server so that operators can install and service the system without affecting the panel's trend data and web-based communication.

In addition, the control system shall be capable of the following functions:
o Data Collection and Utilization
Logs data of system conditions and events, such as pump run time, pump cycles, alarm conditions, and alert conditions.
o Troubleshooting and Diagnostic Logic
Programmed to identify and report suspected failed components (Alarms) and negative trends in operating data (Alerts).
o Advanced Control Logic
Advanced control logic will activate in the event of component malfunction to diagnose the system using pre-established trend data and, if necessary, modify the operation of the system until the system can be serviced.
o Communications and Alarm Management
The control and monitoring system shall operate such that the telemetry control unit will communicate with a web-based monitoring application for reporting and alarm management. The system shall provide for a minimum of three levels of password-protected security access and control to ensure only qualified personnel can access and communicate with the panel. The communication protocol shall allow the operator to communicate with the telemetry unit using any modem (Mac or PC) and a web browser, or a simple communication program (e.g. HyperTerminal or Z-Term). Telemetry units requiring proprietary software shall not be considered.

The telemetry unit will provide automatic notification or call-in to the host in the event of:
- Alarms, which signal fault conditions that need to be addressed immediately (e.g. high or low liquid levels, pump failure, failed contactor, etc.);
- Alerts, which signal less critical conditions that require attention, but which will engage the panel's troubleshooting and diagnostic logic and alternative operating modes (e.g. stuck float switch, leaking tank, brownout, high flows, etc.);
- Updates, which include follow-up reminders or all-clear notifications following Alarms/Alerts, as well as scheduled panel reports;
- Manual forced communication, from panel to host to effect an update of queued programming changes.
In addition, the unit shall have the capability of real-time direct connection to the panel via laptop serial port, to allow the operator real-time access to detailed logged data and the ability to change point values.

Standard Components:
a. Motor-Start Contactor: 115 VAC: 14 FLA, 3/4 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% of FLA). 230 VAC: 14 FLA, 2 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% FLA).
b. Toggle Switch: Single-pole switch, automatic On, with spring-loaded, momentary, manual On. 20 amps, 1 hp.
c. Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 115 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
d. Pump Circuit Breaker: 20 amps, OFF/ON switch. Single-pole 115 VAC, double-pole 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
e. Audio Alarm: 80 dB at 24", warble-tone sound.
f. Visual Alarm: 7/8" diameter red lens, "Push-to-silence." NEMA 4, 1-watt bulb, 115 VAC
g. Panel Enclosure: Measures 13.5" high x 11.3" wide x 5.6" deep. NEMA 4X rated. Constructed of UV-resistant fiberglass; hinges and latch are stainless steel. Conduit couplings provided.
h. S1RO Panel Ratings: 115 VAC, 3/4 hp, 14 amps, single phase, 60 Hz.
i. S2RO Panel Ratings: 230 VAC, 2 hp, 14 amps, single phase, 60 Hz.
j. Vericomm® Remote Telemetry Unit: ATRTU-100; 36/18 VAC (center tap transformer), 8 digital inputs, 4 analog inputs, 4 digital outputs, on-board modem (2400 baud), LED input and output indicators, battery backup.

Optional Components:
k. Pump Run Light: 7/8" green lens. NEMA 4, 1-watt bulb, 115 VAC.
l. Heater: Anti-condensation heater. Self-adjusting: radiates additional wattage as temperature drops.

m. Intrinsically Safe Control Relays: 115 VAC. Listed per UL 698A, for Class 1 Div. 1, Groups A, B, C, D hazardous locations. Larger enclosure required.
n. Current Sensor: 115 VAC. Go/no-go operation. Pump fail indicator light on panel. Manual reset switch.
o. Event Counter: 115 VAC, 6-digit, non-resettable.
p. Elapsed Time Meter: 115 VAC, 7-digit, non-resettable. Limit of 99,999 hours; accurate to 0.01 hours.
Control panel shall be Orenco Systems®, Inc. VeriComm® VCOM S_RO or engineer-approved equal.

8. Installation:
All pumping system components shall be installed in accordance with the manufacturer's recommendations, the engineer's plans, and all state and local regulations.

9. Location:
The pump control panel shall be mounted on a post or exterior wall nearest the tank and pump. If mounting to an exterior wall, try to select a garage or outbuilding where the sound of the motor contactor engaging will not be noticed. If a garage or outbuilding wall isn't available, installation should include use of sound-deadening insulation. (Post and panel mounting assemblies are acceptable.) The control panel shall be located within 50 feet and in sight of the pump motor or shall be provided with a lockable disconnect switch. The panel, when possible, should be mounted in the shade and protected from the weather. The panel should be located at a convenient height (usually about five feet above the ground) and where it will be accessible for maintenance.

Recirculation/Blend Tank

2. Pump Vaults:
Orenco Systems®, Inc. Model PVU84-2425, Universal Biotube® Pump Vault or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have a minimum effective screen area of no less than 20.6 square feet. The Biotube Pump Vault shall consist of a 12-inch diameter, 84-inch deep HDPE vault with eight (8) 2-inch diameter holes evenly spaced around the perimeter, located 25 inches from the base of the pump vault. Housed inside the polyethylene vault shall be the Biotube assembly consisting of 1/8" mesh polypropylene tubes. Attached to the vault is a flow inducer to accept one or two high-head effluent pumps.

3. Discharge Hose and Valve Assembly:
Orenco Systems®, Inc. Model HV200BC w/ HVCWKIT-200, 2-inch diameter, 150 psi PVC ball valve, 150 psi PVC check valve, PVC flex hose with working pressure rating of 64 psi, and Schedule 40 PVC pipe.

4. Float Switch Assembly:
Orenco Systems®, Inc. Model MF3A-YP,G,W with three switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high- and low-level alarms and override enable function shall be preset as shown in the engineer's plans. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC.

5. High-Head Effluent Pumps:
Pump must be approved for use in pump vault described above. Pump shall be Orenco Systems®, Inc. Model P500712, 3/4 hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 10-foot long extra heavy duty (SO) electrical cord with ground. Each pump shall be capable of providing a nominal flow rate of 50 gpm at a head of 57 feet. Pump shall be UL and CSA listed as an effluent pump. Pump shall be provided with a non-prorated five-year warranty.

6. Electrical Splice Box:
Electrical splice box shall be Orenco Systems®, Inc. Model SB5, UL approved for wet locations, equipped with one electrical cord grip and a 1-inch outlet fitting. Also included shall be UL listed waterproof wire nut.

7. Controls and Alarms:
Controls and alarms shall be listed per UL 508. Panels shall be repairable in the field without the use of soldering irons or substantial disassembly. Panel shall be Orenco Systems®, Inc. TCOM-DAX/DAX2 PTROCS/PTROCS HTSAFSGFI control panel or approved equal, meeting the following:
Remote Telemetry Control System
The system will be monitored via remote telemetry with real time efficiency.
In addition, the control system shall be capable of the following functions:

a. Data Collection and Utilization. Logs data for system conditions and events such as pump run time, pump cycles, and alarm conditions.
b. Downloadable Logs. Down load logs into a *.dif or ASCII format for simple conversion to common spreadsheet or word processor programs.
c. Multi-level Password security. Only qualified personnel can remotely access site.
d. Program Logic Rules. Simple "If …then" declarations. Rules can be written based on several operands, including the following:

· Input / output status
· Point status
· Date: mm/dd/yy format
· Time of day: 24 hour clock
· Timers
· Historical data (allows for control optimization or detection of trends)

e. Schedule functions to control digital "Points" based on date or day of week/time.
f. Automatic daylight savings time adjustment.
g. Automatic call-out to pagers during alarm conditions when panel detects trends that could lead to system failure.

In addition, the unit shall have the capability of real-time direct connection to the panel via laptop serial port, to allow the operator real-time access to detailed logged data and the ability to change point values.
Standard Components:
h. Motor-Start Contactor: 230 VAC: 16 FLA, 3 hp, 60 Hz; 2.5 million cycles at FLA (10 million at 50% FLA).
i. Toggle Switch: Single-pole switch, automatic On, with spring-loaded, momentary, manual On. 20 amps, 1 hp.
j. Controls Circuit Breaker: 10 amps, OFF/ON switch. Single-pole 115 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
k. Pump Circuit Breaker: 20 amps, OFF/ON switch. Double-pole 230 VAC. DIN rail mounting with thermal magnetic tripping characteristics.
l. Audio Alarm: 80 dB at 24", warble-tone sound.
m. Visual Alarm: 7/8" diameter red lens, "Push-to-silence." NEMA 4, 1-watt bulb, 115 VAC
n. Remote Telemetry Unit: ATRTU-Net; 24 VDC (center tap transformer), 8 digital inputs, 8 analog inputs, 8 digital outputs, 2 analog outputs, on-board modem (9600 baud), and battery backup.

Optional Components:
o. Pump Run Light: 7/8" green lens. NEMA 4, 1-watt bulb, 115 VAC.
p. 3 way (main, auto, off) manual power transfer/disconnect switch
q. 115VAC Ground fault interrupter (GFI)
r. Surge Arrestor: Single Phase: AG2401 120/230V, three 18" leads, rated for a maximum of 32,000amps, UL/CSA listed. Three Phase: AG6503 120/230V, four 18" leads, rated for a maximum of 48,000amps, UL/CSA listed.
s. Heater: Anti-condensation heater. Self-adjusting: radiates additional wattage as temperature drops.
t. Current Sensor: 115 VAC with adjustable high & low alarm set points.

8. Location:
The pump control panel shall be mounted on a post or exterior wall nearest the tank and pump. The control panel shall be located within 50 feet and in sight of the pump motor or shall be provided with a lockable disconnect switch. The panel, when possible, should be mounted in the shade and protected from the weather. The panel should be located at a convenient height (usually about five feet above the ground) and where it will be accessible for maintenance.

9. Recirculating Splitter Valve Assembly:
Orenco Systems®, Inc. Model RSV4U, 4-inch diameter ball valve assembly to provide guaranteed return of treated effluent returning from filter. The ball valve is designed to redirect 100% of flow to recirculation/dilution tank during periods of low flow or 20% of return flow to discharge and 80% to the recirculation/dilution tank during periods of high flow. Must be manufactured of corrosion resistant PVC and rubber components and allow for easy removal using unions. The item is patented and the engineer knows of no equivalent.

10. Installation:
All pumping system components shall be installed in accordance with the manufacturer's recommendations, the engineer's plans, and all state and local regulations.
AdvanTex® Treatment System
All components shall be supplied by a reputable manufacturer with at least five years of experience in supplying equipment for onsite treatment systems. References must be available on request from the engineer.

1. Distributing Valve Assembly:
Valve shall be provided as a complete assembly including inlet ball valve, distributing valve with two outlet ports, Schedule 80 unions for valve removal, cleaning, and clear PVC ports for inspection. Valve manufactured of corrosion resistant ABS polymer, stainless steel, and die cast metal. Assembly shall be Orenco Systems®, Inc. Model V6402A or approved equal. Each distributing valve shall include the following:
a. Distributing valve assembly shall be enclosed in ribbed PVC access riser as manufactured by Orenco Systems®, Inc. or approved equal. The material shall be PVC as per ASTM D-1784 and tested in accordance with AASHTO M304M-89. Risers shall extend to two inches above the ground surface to allow for settlement and shall have a minimum nominal diameter of 30 inches.

b. One lid shall be furnished with each access riser. Lids shall be Orenco Systems®, Inc. Model FL30GI4 or approved equal, fiberglass with green non-skid finish, 2-inches insulation and provided with stainless steel bolts, and wrench. The riser and lid combination shall be sealed for watertightness and able to support a 2500 lb. wheel load. (Note: This is not to imply that PVC risers are intended for traffic areas.) All fasteners shall be made of corrosion resistant stainless steel.

c. Rigid closed-cell foam insulation of 4-inch thickness shall be mechanically attached to the underside of the lid. All fasteners shall be made of corrosion resistant stainless steel. The insulation shall have an R-value of no less than 10 per 2-inch increment.

2. AdvanTex® Treatment System:
Orenco Systems®, Inc. AX100I AdvanTex® Treatment System installed in conformance with the engineer's plans. The AX100I is a packed bed filter consisting of a proprietary textile media. The media has been specifically engineered for wastewater applications. Each AdvanTex pod shall include the following:

· Rigid closed-cell foam insulation of 1-inch thickness shall be mechanically attached to the underside of the lid. All fasteners shall be made of corrosion resistant stainless steel. The insulation shall have an R-value of no less than 10 per 2-inch increment.

3. Transport Piping / Fittings:
a. All transport piping and fittings from the recirculation/blend tank shall meet a minimum pressure rating of Schedule 40.
c. The AdvanTex® pod return lines shall be Class 125 or higher pressure. All fittings shall be Schedule 40.

4. Installation
All AdvanTex® components shall be installed by a trained installer authorized by Orenco or Orenco's representative and in accordance with the manufacturer's recommendations, the engineer's plans, and all state and local regulations.

Drainfield Dosing
2. Pump Vaults:
Orenco Systems®, Inc. Model PVU68-1819, Universal Biotube® Pump Vault or engineer-approved equal, installed in conformance with the engineer's plans. The filter shall have a minimum effective screen area of no less than 15.5 square feet. The Biotube Pump Vault shall consist of a 12-inch diameter, 57-inch deep HDPE vault with eight (8) 2-inch diameter holes evenly spaced around the perimeter, located 19 inches from the base of the pump vault. Housed inside the polyethylene vault shall be the Biotube assembly consisting of 1/8" mesh polypropylene tubes. Attached to the vault is a flow inducer to accept one or two high-head effluent pumps.

3. Discharge Hose and Valve Assembly:
Orenco Systems®, Inc. Model HV150BC, w/ HVCWKIT-150 1 1/2-inch diameter, 150 psi PVC ball valve, 150 psi PVC check valve, PVC flex hose with working pressure rating of 70 psi, and Schedule 40 PVC pipe.

4. Float Switch Assembly:
Orenco Systems®, Inc. Model MF3A-YP,B,R,W with four switch floats mounted on a PVC stem attached to the filter cartridge. The floats must be adjustable and must be removable without removing the pump vault. The high/lag, low-level alarms and pump on and off function shall be preset as shown in the engineer's plans. Each float lead shall be secured with a nylon strain relief bushing at the splice box. The floats shall be UL or CSA listed and shall be rated for a minimum of 5.0A @ 120 VAC.

5. High-Head Effluent Pumps:
Pump must be approved for use in pump vault described above. Pump shall be Orenco Systems®, Inc. Model P300512, 1/2 hp, 230 VAC, single phase, 60 Hz, two-wire motor, with 10-foot long extra heavy duty (SO) electrical cord with ground. Each pump shall be capable of providing a nominal flow rate of 30 gpm against a head of 58 feet. Pump shall be UL and CSA listed as an effluent pump. Pump shall be provided with a non-prorated five-year warranty.

6. Electrical Splice Box:
Electrical splice box shall be Orenco Systems®, Inc. Model SB6, UL approved for wet locations, equipped with one electrical cord grip and a 1-inch outlet fitting. Also included shall be UL listed waterproof wire nut.

F. TOOLS FOR SEPTAGE MEASUREMENT

1. Scum Measuring Utility Gauge (SMUG) - Contractor shall provide a minimum of one scum measuring utility gauge per 100 units. The gauge shall consist of a minimum 3/8" diameter stainless steel rod with an incremental scale for measuring scum levels. The rod shall be bent at a 90-degree angle at the base to aid in identifying the scum "by feeling." The gauge shall be Orenco Systems®, Inc. Model SMUG or engineer-approved equal.

2. Sludge Measuring Device - Contractor shall provide a minimum of one engineer-approved sludge measuring device per 100 interceptor tanks.

GENERAL NOTES & SPECIFICATIONS

This plan set is based upon the expected flows and waste strengths dated June 30, 2005 for the purpose of serving Canter Park of Long Grove. Any changes in usage that would affect flows or waste strength requires a review by this designer.

Expected Influent Characteristics:

Characteristic	Rarely Exceeds	Average	Weekly Peak
BOD	500	150	250
TSS	150	40	75
TKN	150	65	75
FOG	30	20	25

Once the facility is placed into operation, the flows and waste strengths to the facility shall be monitered. If flow or any of the influent waste strengths exceed those listed in the design above, measures shall be taken to reduce these parameters to those listed above. Otherwise additional treatment capacity and plant expansion is necessary. Toxics or chemicals shall not be disposed of into the system Examples: restaurant degreasers and cleansers, wax stripper for linoleum, carpet shampoo, and waste products from other toxics.

FIBERGLASS TANKS

In order to demonstrate watertightness, tanks shall be tested at the factory and again on-site prior to acceptance. Each tank shall be tested at the factory, prior to shipping, by filling with water to the soffit and letting stand for a minimum of two (2) hours. Any leakage shall be a cause for rejection. After installation is complete and before backfilling, completely fill the tank with water, to a level two (2) inches into the riser. Wait a minimum of two (2) hours (or as required by the Lake County Health Department) and inspect the tank for leaks. There should be no drop in liquid level and no visual leakage from seams, pinholes, or other imperfections. Once the tank is proven to be watertight, drop the water level in the tank below the invert - but not below mid-seam.

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STATE OF ILLINOIS

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EASTGATE ESTATES
LAKE COUNTY, ILLINOIS

GENERAL NOTES AND SPECIFICATIONS

DATE	BY	NO.	REVISION
5/01			LCHD
4/20			Land Plan Changes

SHEET 10 OF 11

DATE: 12/10/2005